

Group Farming– means to end Poverty and Hunger in Villages

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Abstract

Amrita Sadivaial Vyavasayam Kulu, a group comprising of twenty farmers, belonging to the tribal community of Irulas, initiated organic farming at Sadivaial, a tribal hamlet in the suburbs of Coimbatore, Tamil Nadu. This paper explores the case of organic agriculture in a tribal village in Tamil Nadu. Amrita SeRVe is an initiative launched by the Mata Amritanadamayi Math. One of its main objectives is to motivate farmers to make the transition to organic agriculture and hand-hold / mentor them as they make the switch. Amrita SeRVe (Self Reliant Village project) planned and helped the farmers from tillage, collection of seeds, preparation of manures and pesticides, introduction of technological innovations, modern methods in production and processing of raw materials till the marketing of products. This experiment tried at Sadivaial united the farmers in a pristine culture of sharing, caring, protecting and selling paddy together. This empowered them to know and bargain for their rights. This was clearly demonstrated in their farming practices, done without any instance of money-lending or of borrowing loans from banks.

Keywords: Organic Farming, Convergence Method, tribal hamlet, Bhavani rice, Tamil Nadu, Sustainable development, Organic rice production, panchagavya, jivamritham, mulching.

Introduction

The research investigated the farming practices of small and marginal farmers involved in organic rice production in Sadivaial village, Thondamuthur Block, Coimbatore, Tamil Nadu, India, with the support of Amrita SeRVe. Amrita SeRVe is an NGO which plays important roles from organizing the farmers in groups,

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opening bank accounts, purchasing seeds, supporting capacity building and finally to branding and marketing. The study of farming practices shows that organic rice production by small and marginal farmers in Sadivaiyal is not profitable through conventional practices. Therefore, most of the farmers had stopped farming. The well-known rice-plots became corridors for wild animals like elephants, wild boars and bears.

In the absence of irrigation facilities, farmers primarily depended on rain-fed agriculture. Owing to water scarcity, annual rice cultivation became a non-profitable activity. Hence they had stopped farming for the past five years, and had resorted to daily-wage labour in the forest vicinity, for their livelihood. Consequently, many farmers were in the grip of heavy debts which they owed to the rural moneylenders. Amrita Sadivaiyal Vyavasaya Kulu (Amrita Sadivaiyal Farmers Club), a participatory system of farmers interested in organic farming was constituted. Twenty members made an initial contribution of Rs.500 each, and opened a joint bank account in Canara Bank, Alandurai. Organic agriculture was undertaken on thirty-five acres of agricultural land.

The Convergence Method of Farming drastically cut the entire cultivation costs, which resulted in substantially higher profits.

About the village

The tribal hamlet of Sadivayalpatti, is located in Madvarayapuram Panchayath, Thondamuthur block, Coimbatore District of Irula community with 44 households and a population of nearly 150. It is located about 30 km from Coimbatore on the fringes of a reserved forest area.

The cultural ethos of Irula tribes is based on living in harmony with Mother Nature. However, unfortunately, several of their generations have been victims of caste discrimination, infringement of right to livelihood, forcible encroachment, wage discrimination, and poor literacy. This has negatively impacted their confidence, health, education, and the overall living standards. Since their lands are in the reserved forest area, they do not have title deeds

(*pattayams*), thus rendering them ineligible for all the government schemes. They prefer doing jobs inside the village and do not venture outside in search of jobs. Some of the men and women are employed as daily wage workers at the forest check post. But a few families used to cultivate their lands for farming. In the months of April–May the village youth toil in menial jobs at the Velliangiri Andavar temple which is known as ‘Kailash of the South’. The able-bodied youth aid in carrying pilgrims across seven mountains to reach the temple. They also carry heavy sacks of essentials like food, water, clothes, and the like. They earn up to Rs.2000/- per day for 60 days, which is enough to support their family for half a year. But sadly, owing to alcohol addiction the earnings become futile.

About the NGO (Amrita SeRVe - Self Reliant Village project)

The hardships experienced by the villagers of Sadivayail came to the attention of Amrita SeRVe, an NGO created in 2013 by spiritual leader Sri Mata Amritanandamayi Devi, who reached out to help.

Real-time situation

When the Amrita SeRVe team first visited in May 2016, the land was almost dry. The team took a participatory approach with Sadivayail residents to incorporate their understanding, knowledge and opinions of rice farming. The village primarily depends on a rainfed system of agriculture and as there is an absence of proper irrigation facilities, rice cultivation could only occur once a year. It became apparent that after resources were allocated to increasingly expensive labour costs and inputs (such as chemical fertilizers and pesticides), agriculture was not a lucrative business. Studying their farming practices revealed that organic rice production by small and marginal farmers was not as profitable by conventional practices; therefore they had to engage in daily wage labour activities in nearby forest areas to sustain themselves throughout the year. Eventually most of the farmers abandoned farming by around 2010 and as they live in foothills under forest cover, the once well-known rice plots became

a corridor for wild animals like elephants, wild boar and bear. These wild animals are a menace which destroys rice cultivation. Storage facilities were also a matter of concern as suitable space for their product was very limited. Farmers had to sell very quickly after harvest to avoid wastage. As marketing opportunities linking the rice producers to markets in Coimbatore are numerous, fast distribution should not be a problem, however promotion of the farmer's product was not taken up by government and forest officials.

Establishing needs

Those in the communities of Sadivayail are all living Below Poverty Line (less than \$2 a day) therefore raising the standard of living and increasing food security are paramount. The aim of Amrita SeRVe was to investigate the practices of the small and marginal farmers, and determine the impact of an organic production system on farming practices in the village, and establish how they could assist in developing a sustainable and viable organic rice production operation as a stream of income for the community.

Frame Work

Using Participatory Rural Appraisal (PRA) methods such as group interviews, discussions and activities, transect walks, and livelihood analysis (Chambers 1994), it was concluded that group farming was the best method to enhance the capacity and capabilities of the villagers. When combined with support from the Government of India's (GoI's) convergence methods initiative (MRD 2010), the framework for the Sadivayail organic rice farming was set. Through the consultation process, the Amrita SeRVe team also established who wanted to engage in organic farming and who was interested in semi organic.

Group Farming

Group farming involves multiple individuals who share resources for the purpose of farming. With a focus on group functioning over individual goals (Olatunji & Letsoalo, 2013), it offers all round support that larger operations extend

such as lower costs of production, and more effective use of land, manpower, and capital. For example, if 20 farmers join together, maybe only two of those farmers own a tractor; in group farming those tractors are shared among the rest. This type of collective farming can attract higher economic returns (Galeski 1987), where a minimal initial investment can lead to an enhanced and sustainable livelihood.

Objectives of Group Farming

- Increase crop cultivation
- Market the produce collectively.
- Producing value added products for more profit.
- Reduced production expenditure and increase in income.

Benefits of Group Farming

- Creation of common assets.
- Common marketing/procurement of products/raw materials by partnerships through agreement.
- Increased access to government programs and policies.
- Profitable price realization for products.
- Technical assistance to improve the quality of products.

Convergence

Substantial efforts and investments are being made by the Government of India (GoI) to strengthen the rural economy and enhance the livelihood base of the poor, especially marginalized groups like Scheduled Castes and Tribes, and women. Taking an inter-department approach, the convergence method is the need of the hour and highly recommended by the GoI. The convergence of different government programs, technical expertise, funding, and social mobilization, enables better planning and effective investments in rural areas (MRD 2010, p.2):

“This convergence will bring in synergies between different government programmes/schemes in terms of planning, process and implementation [and] will also facilitate sustainable development”.

The underlying mechanism of Convergence Farming is to draw from various resources from the individual through to societal level, to build a solid supply and demand for nutritious food. Converging various areas of production, including training to farmers, seed purchasing, preparation of organic fertilizers and pesticides by the farmers themselves, distribution and promotional networks, can lead to not only economic independence but also social empowerment. Taking the food system as the bottom of the pyramid, an objective of the organic farming initiative, was to establish 100 per cent organic farming production within a three-year period using the convergence and group methods.

Constraints

Participatory Rural Appraisal (PRA) methods were used to gain an understanding of the challenges faced by the community and generate ideas for solutions.

i. Existing irrigation System

The agriculture is primarily rain-fed, while irrigation is completely dependent upon water from the main stream and the five borewells. Mud bunds built by the farmers help channelize water from the natural stream for irrigation. This water is diverted to a couple of nearby villages and hence is insufficient for irrigation. In spite of a proper water budgeting system in Sadivaial, still there is a shortage of water for paddy cultivation in the 35 acres of land. All five borewells are not operational, thus severely constraining the irrigation process. Many parts of the borewells are missing.

Amrita SeRve aided in repairing two borewells at prime locations. The Electricity Board connection was revived after persistent efforts at various levels. But, an important concern is the extraction and repair of two submersible pumps installed at depths of about 400ft. They are unfit for use from the past seven

years. In spite of all these measures, the amount of water will not be sufficient for irrigation for the second crop during the months of February to June.

ii. Permanent Solution for water

The village is surrounded by the Western Ghats and the *Kovai Kutralam* waterfall is three kilometers away. This natural water source situated at an elevated hillock supplies abundant water for up to eight months, provided the rainfall is normal (80cm). By constructing an overhead tank at the source the water can be channelised through the existing underground pipe-way to reach the village. Proper water management by storing at various points using silpaulin or artificial ponds will ensure its availability for second crops like vegetables, millets and pulses. The approximate cost for the suggested solution is about Rs.3 lakhs, and is presently being discussed.

iii. Wild Animals

It was expressed there was an essential need for solar fencing to assist in curbing this problem.

iv. Structural, Systemic and Institutional challenges

These include corruption and misuse of tribal funds; absence of proper land deeds so that they can apply for government loans or schemes; false promises from different agencies.

v. Social challenges

These include alcoholism, debt, lack of trust and loss of confidence in themselves.

Organic Farming Initiative

Farmer's Club and Bank Account

On 09 May 2016, a resolution was passed at the village level where twenty of the most deprived families of the village were selected to start group farming.

The first step was forming a farmer's club which was named Amrita Sadivayail Vyavasaya Kulu (Amrita Sadivayail Farmers Club). Each of the twenty members initially contributed Rs 500, and with the help of Amrita SeRve they opened a bank account at Canara Bank, Alandurai under the name of Amrita Vyavasayam Kulu. The total land holdings were thirty-five acres and all twenty farmers decided to go organic. The Amrita SeRve team worked with the farmers to address their need for self-determination and ownership, and together they defined the responsibilities and formulated guidelines for internal management.

Collaboration and Convergence

Amrita SeRve played an important role in organizing the farmers into groups and guiding them in the proper direction, starting with activities like selection and purchase of seed, soil testing, organizing tractors for primary and secondary tilling, crop planning, water budgeting and water conservation measures, setting up technical training opportunities, giving support in capacity building, and finally branding and marketing.

The farmer group contributed their labour for land clearance, land development, land plotting, constructing water channel, and fencing the area. Jointly working with government departments using convergence method, the tractor for primary-tillage and cage wheel was rented from PudhuVaazhvu (Farmers' Federation), seed provided by the Tamil Nadu Agricultural University (TNAU) and also Dr Maya Mahajan project fund for organic farming, Department Of Science & Technology - Science For Equity Empowerment and Development (DST-Seed) Project (Central Government Scheme). Organic Manure and Bio-pest was prepared by farmers under the guidance of Dr Usha, Professor Organic Department, Kerala Agriculture University and Thannal an agency from Kerala.

Table 1. Tribal Farmer Beneficiaries & cultivating land

SL No	Name of Tribal Hamlet	Total No of Beneficiaries	Cultivable Area (Acres)	Under Cultivation (Acres)	Available land for utilization	Type of land
1	Sadivayail	48 house holds	40	35	5	Tribal settlement land

Initial Land Preparation

After all PRA exercises, open discussions and interviews, farmers began their organic rice production activities on June 20th 2016. The initiative used a blend of both traditional and modern technology, group farming and convergence methods for manure and pesticide application, innovation and even banking.

Compost Pits

Eight organic pits of dimension 7X7 ft were prepared 60 days before tilling the land. The pit was filled with crop residue, animal wastes, food garbage, cow-dung, and different leaves available in the forest area which easily undergoes composting.

Mulching

The top soil was covered with plant material such as leaves, grass, herbs etc. Mulching enhances the activity of soil organisms such as earthworms. It helps prepare the soil structure in such a way that plenty of small and large pores are created through which rainwater can easily infiltrate the soil, thus reducing surface run-off.

Side Protection

Infrastructure support to paddy cultivation includes strengthening and repairing of natural bunds which exist from the past ten years. They help channelize the water to reach the proper destinations without loss at any stage. It also helps to increase the ground water level because the excess water seeps through the soil.

Traditional Irrigation Systems

The existing irrigation system was repaired which enhanced the connectivity to different fields. It helped to save large amounts of water and also increased the ground water level.

Capacity Building on Organic Manure

From the very onset Amrita SeRve trained the farmers in preparing organic manures like Beejamritam, Jeevamritam, Panchanmritam and other organic pesticides.

Pest Control

The objective of natural pest control is to restore the balance between the ‘pest and predator’ by keeping the pests and diseases down to an acceptable level. The aim is not to eradicate them altogether, as they also have a role to play in the natural system. Anjilakeedaviratti is a pest control made of five sap-leaves and soaked (for 48 hrs) in water (10lts) and cow urine (5lts). Another pest control measure is a home-made mixture of tobacco leaves mixed in water (10lts) and cow urine (5lts). Green chilly (100gms) mixed with cow urine (5lts) was applied at different stages of growth. Such environment-friendly measures helped protect the flora and fauna of the forests. They also reduced the costs from Rs.10,000 to Rs.2000 per acre.

Preparation of Beejamritham Beejamritham for 50 kg of Rice: Items needed are 1 kg cow dung, 1 litre cow urine, 10 gm Lime, 5 litres water snf top soil preferably below Mango/Jackfruit tree. Mix it with rice and keep for 24 hours.

Preparation of Jeevamritham Take 10 kg of cowdung, 10 litres cow urine, 2 kg Green gram/ Horse gram, 500g virgin soil, 1 kg Jaggery or 2 lt coconut water. Mix in 200 lt drum, stir clockwise three times a day and use within 10 days.

Use of Plant products These include herbal extracts *Aryaveppu, Karinichi, Thulasi, Koovalam, Manjal, Vinca, Palmarosa, Datura, Pungam*; Oil and oil

cakes (*Heem, Pungam, Marotti*); leaf extract of Eucalyptus, *Thulasi*, extract of *karuka* – Apply using 300 ml of liquid in 10 lit of water.

Botanical pesticides for insects: Add 500 bar soap to 500 ml warm water. When cool add 200 ml neem oil. Take 200 g garlic – grind with 300 ml water. Mix well. Add 9 lit of water, filter and spray.

Reason for Choosing Bhavani Rice

The Green Revolution witnessed the distribution of particular rice types that were amenable to technology-tweaking and higher inputs like chemical fertilizers, resulting in a decline in diversity among other varieties (Ramanjaneyulu 2015). The production and use of Bhavani rice has been on the decline over the last 10 years, however it was once a staple food of the Sadivayail village as well as Tamil Nadu. The farmers suggested that they prefer to grow Bhavani rice because of its taste, reasonable price and nutritional value. It is also in high demand among the Flattened rice (also called beaten rice) and Aval or Poha making industries. The potential for sale of by-product also increases as its hay (or straw) are also in high demand among farmers and mushroom growers. With this, the initiative is also trying to bring about good health habits and generate a traditional seed bank for Bhavani rice.

The Process

Amrita Sadivayail Vyavasaya Kulu (Amrita Sadivayail Farmers Club) purchased 590 Kg of rice from various sources using convergence method (500 kg using DST-Seed and 90 Kg from Tamil Nadu Agricultural university). For one acre of land almost 25 Kg was required and was purchased at the rate of Rs.30/Kg. Primary tillage is done using a *tooth* harrow (five tooth) to further loosen the previously ploughed land before sowing. This method is also used to destroy weeds that germinate after ploughing. At the same time as the primary tillage, seeds are kept for 24 hours soaked in a traditional Beejamritham solution for seed treatment which prevents and controls seed, soil, and air-borne diseases. Seeds are drained and dried in bags for 24 hrs in a shady area where air can circulate around the bags.

Secondary tillage using cage wheel is used to prepare the wet land and final harrowing and leveling just before sowing. It helps in breaking of clods and mixing of crop residues. Eight seed beds were then prepared at different locations. Pre-germinated seeds were broadcast in the well-leveled seedbed. The seedbed was irrigated three days after sowing with water coming from the natural main stream from the top of the hill. Farmers applied Jeevamritham, Beejamritham at regular intervals. Monitoring of the seedbed and regular visits were done to observe occurrence of pests or diseases. Twenty-six day old seedlings were transplanted to the prepared paddy. Random planting methods were used for transplantation where two to three seedlings are transplanted per hill. For one acre, an average of six women worked for one and half days. Different groups worked for fifteen days to complete all thirty-five acres of land. Water in the paddies is maintained at three to five cm depth during most of the growing period. Farmers use hand-weeding method to remove weeding at regular intervals of time. Days required for harvesting were 140 days out of which the farmers are applying organic fertilizer and pesticide for 110 days. Direct control of weeds can be done through manual weeding by hand and starts between twenty to forty days after sowing.

Cost Analysis

Cultivation of rice has many steps, starting from tilling to harvest and post-harvest processing. The steps are labour as well as input intensive. In this section expenses regarding each input at every step were gathered and finally calculated for the entire cultivation. The analysis is based upon a comparison between the expenses and income a regular conventional farmer would face (information gathered from an outsourcing company/data source (who is locally renting tractor, tiller, labour, seed, fertilizer and pesticide), and farming using the group convergence method such those in Sadiyaval. *Outsourcing* is purchasing goods and getting rented services from an organization or farmer outside the community.

Primary Tillage

Primary tillage is done to attain depths of soft soil with varying clod sizes. It also kills weeds by burring or cutting and exposing roots to the soil. A cultivator/ tiller is attached to the tractor and run through the field. Table 2 may be seen for a description of expenses involved in this stage of production.

Table 2. Primary Tillage

Primary Tillage							
Particulars	Out Source Rate			Convergence Rate			
	Unit		Total Rate		Total Rate	Total Rate	Amount Saved
Rate Of Diesel Per Lt	Rs	58		58			
Time Required For 1acre (Hr)	Hr	2.5		2.5			
Diesel Required Per Hr (Lt)	Lt	4		2			
Total Diesel Required Per Acre (Lt)	Lt	10	580	5	290	290	290
Driver Charge Per Hr(Rs)	Rs	150	375	50	125	250	125
Tractor Rent	Rs	200	500	0	0	500	0
Maintenance Cost Per Hr	Rs	100	250	100	250	0	250
Food Expense	Rs	200	200	0	0	200	0
			1905		665	1240	665
Total			1900		700	1200	700

Conventional singular farming methods (Outsourcing)

Data obtained from external sources state that the time taken for primary tilling is around 2.5 hours per acre of land and uses 4 litres of diesel per hour, totaling 10 litres per acre. Considering the price of diesel is Rs.58.00 per litre, then total expenses on diesel for this purpose would be around Rs.580.00 (Rs.58.00 (/lt)*4(hr/acre)*2.5(lt/hr)). Renting the tractor from an external organization costs around Rs.200 per hour and is required for 2.5 hours, totaling Rs.500.00. Estimated cost for maintenance is Rs.250.00. Hiring the driver costs Rs.150.00 per hour and is required for 2.5 hours, totaling Rs.375.00 for labour per acre, plus their food expense of Rs.200.00. Adding these expenses together, shows that the final cost per acre for primary tillage is Rs.1900.

Convergence and group farming

Primary tillage by the group using convergence method found the amount of diesel used per hour was just under half of the above estimated costs, i.e. 2 liters required per hour. This might be because the tractor rented could be an old model and not well maintained, whereas the tractors owned by the farmers in the group are a newer model and maintained well. Therefore the diesel cost per acre in convergence was Rs.290.00 (Rs.58 (/lit)*2 (lit/hr)*2.5 (hr/acre)). Since the tractors were owned by two of the farmers, there were no renting costs, but similar maintenance costs were experienced as in outsourcing method (Rs.250.00). Since the drivers belong to the group they charged only Rs.50.00 per hour, totaling Rs.125.00 per acre since he belongs to the same village there would not be any food expenses as they take their food in their respective houses. The final expenses show Rs.665 per acre via the method of convergence for primary tillage.

Secondary Tillage

Secondary Tillage is to improve the seedbed by increased soil pulverization, to conserve moisture through destruction of weeds, and to cut up crop residues by using various types of harrows, rollers or pulverizers, and tools for mulching and fallowing. The following Table 3 outlines the expenses of both outsourcing and convergence methods for secondary tilling.

Table 3. Secondary Tillage

Particulars	Out Source Rate			Convergence Rate		Amount Saved
	Unit		Total Rate		Total Rate	
Rate of Diesel Per Lt	Rs	58		58		
Time Required For 1acre (Hr)	Hr	14		7		
Diesel Required Per Hr (Lt)	Lt	6		6		
Total Diesel Required Per Acre (Lt)	Lt	84	4872	42	2436	2436
Driver Charge Per Hr (Rs)	Rs	150	2100	100	700	1400
Tractor Rent	Rs	200	2800	0	0	2800
Maintenance Cost Per Hr	Rs	200	2800	100	700	2100
Food Expense	Rs	200	200	0	0	200
Total			12772		3836	8936
Round-Off			13000		4000	9000

Conventional singular farming methods (Outsourcing)

In Outsourcing, the time spent for secondary tilling for one acre is approximately 14 hours and requires 6 litres of diesel per hour, totaling 84 litres ($14(\text{hr/acre}) \times 6(\text{litre/hr})$) required per acre of land. One litre of diesel costs Rs.58.00, so for 84 litres, Rs.4872.00 is required. The tractor driver charges Rs.150 per hour for secondary tilling of land, thus the total cost for the driver is Rs.2100.00. Renting a tractor from external organization costs Rs.200.00 per hour, therefore 14 hours costs Rs.2800.00. Maintenance of the tractor per hour costs Rs.200.00, leading to an expense of Rs.2800.00 per acre. Food expense for the driver is Rs.200.00. Through outsourcing the total cost that is likely to be spent on secondary tilling per acre is Rs.12772.00 which may be rounded up to Rs.13000.

Convergence and group farming

When compared with secondary tilling practice through convergence, the expenditure goes down incredibly. The outsourcing organization claims the working hours per acre to be 14 hours however the group found the actual working hours to be 7 hours. This might be due to the business tactics they follow i.e., the more time the customer rents, more the money they can claim. In convergence, there is no cost to rent the tractor, because two members of the group have a tractor and they share with other members. They found the expense for diesel is Rs.2436.00 ($\text{Rs.}58.00/(\text{lit}) \times 7(\text{hr/acre}) \times 6(\text{lit/hr})$). The driver charge is Rs.100.00 per hour since he belongs to the same group, thus the expense for total time is Rs.700.00. Money spent on maintenance of tractor is Rs.700.00 since the rate per hour is Rs.100.00. The total expenditure for secondary tillage using convergence is Rs.3836.00 rounded up to Rs 4000.

Tiller

A tiller is a small piece of equipment used with a tractor engine that is commonly operated for preparing the soil for seed beds. Seed beds are a small raised

platform of land in which the seed are first grown then transplanted to the main fields. Table 4 describes the expenses of both outsourcing and convergence methods in tiller use.

Table 4. Tiller

Particulars	Out Source Rate		Convergence Rate			Amount Saved
	Unit		Total Rate		Total Rate	
Rate Of Diesel Per Lt	Rs	58	13.34	58	13.34	0
Tractor Rent Per Hr	Rs	200	46	0	0	46
Driver Charge Per Hr	Rs	100	23	25	5.75	17.25
Maintenance Cost Per Hr	Rs	100	23	120	120	-97
Food Expenses	Rs	200	46	0	0	46
Total			151.34		139.09	12.25
Round-Off			150		140	10

Conventional singular farming methods (Outsourcing)

In outsourcing, a total of 35 acres of land needs 8 seed beds using a total 40 cents worth of seeds. Therefore, one acre of land to be planted with rice requires 1.15 cents (i.e. 40 cents/35 acres). The calculation for all the particulars used are converted from 8 seed beds to that of particulars used for the fraction of seed bed that is to be transplanted on to one acre of land. For example, 1litre of diesel is required for making 1 seed bed then diesel spent in order to prepare land for one acre is 0.23lt i.e. $8(\text{beds}) * 1(\text{Lt}/\text{bed}) / 35(\text{acres})$. Thus, the money spent on diesel is Rs.13.34. Similarly, the tractor rent at Rs.200.00 per hour is converted as Rs.46.00 per acre. In the same way the driver charge, maintenance and the food expenses are calculated as Rs.23.00, Rs.23.00 and Rs.46.00 per acre respectively. All expenses combined amount to Rs.151.34.

Convergence and group farming

In the method of convergence, the above-mentioned conversion of particulars from 8 beds to the fraction of seed bed used for one acre is applicable. The expenses on diesel is Rs.13.34. Tractor rent is nullified since the tractor is owned by a member of the group. The tractor driver is from the same village so

cost is only Rs.25.00 per bed. The maintenance turned out to be higher because the tiller which the people had was not in a good workable condition, so it had to be repaired before usage. The repairing cost is included in the maintenance. Total amount spent on repairing the tiller was Rs.4000.00, when this amount is equally shared as the maintenance cost for the tiller among 35 acres, it gives Rs.120.00 per acre. This cost in the upcoming seasons will reduce the working maintenance cost alone thus reducing the input on the category. All the expenses for tilling using the convergence method is Rs.139.09 ie. around Rs.140.

Pre-Harvesting

This section of farming is highly labour intensive and time consuming. The step includes many processes like transplantation, regular weeding, irrigation and maintenance of the crop till the harvest. Table 6 outlines the expenses of both outsourcing and convergence methods in the pre-harvesting phase.

Table 5 Cost of transplantation of crop for one acre

Cost of transplantation of crop for one acre			
Particulars	Outsourcing	Convergence	Saving
For 10 women / acre (Rs)	8000	6000	2000

Table 6 Pre-harvesting cost

Particulars	Unit	No. of Works Involved	Rate Per Work	Out sourcing	Rate Per Work	Convergence	Saving
Seed				505.7143		0	
Bio-Fertilizers	Rs			10000		2000	8000
Bio-Pest Control	Rs			10000		2000	8000
Weed Removing	Rs	20	600	12000	300	6000	6000
Transplantation				8000		6000	
Transportation				1000			1000
Capacity And Institution Building				10000		0	10000
Seed Sowing		2	600	1200	300	600	600
Irrigation Maintenance	Rs	20	600	12000	300	6000	6000
Nursery Maintenance		5	600	3000	300	1500	1500
Insurance	Rs			1000			1000
Total				68705.71		24100	44605.71
Round Up				69000		24000	45000

Conventional singular farming methods (Outsourcing)

In outsourcing, the seed can be purchased from the public or private seed sector and should cost approximately Rs. 500.00 per acre. Since they do not have sources to produce bio-fertilizers and bio-pest control, they are forced to buy from the Bio-Fertilizer Company. Both bio-fertilizer and bio-pest control agents cost approximately Rs.10,000.00 each. Transportation cost for the required materials like seed, bio-fertilizer and bio-pest control is approximately Rs. 1,000.00. The pre-harvesting phase also needs human labour for weed removal, transplantation and seed sowing, etc. For weed removal labour costs Rs. 600 per acre, the number of people working in the field is five per acre, and they have to remove weed four times periodically (within a harvest). This calculates to Rs. 12,000.00 ($600 \text{ (Rs/person)} * 5 \text{ (person/acre)} * 4$). For seed sowing the costs are Rs.600.00 as well, but requires less people therefore money spent on seed sowing is Rs. 1200.00 ($600 \text{ (Rs/person)} * 2 \text{ (person/acre)}$). For transplantation the salary expected by the worker is Rs. 800.00 per acre, and ten people work, giving the total amount spent as Rs. 8000.00. For irrigation and nursery maintenance, people claim Rs. 600.00 per acre for both, but the required number of workers is twenty and five, respectively, which makes the total amount Rs. 12,000.00 ($600 \text{ (Rs/person)} * 20 \text{ (person/acre)}$) for irrigation and Rs. 3000.00 ($600 \text{ (Rs/person)} * 5 \text{ (person/acre)}$) for nursery maintenance. Capacity Building and Training require Rs. 10000. In total, the expenses for pre-harvest are Rs.68705.71. The total amount can be rounded up to Rs 70000.

Convergence and Group Farming

In convergence, since the farmers themselves save seed for the next cultivation, there is no necessity for buying the seed from an external source. They also use cow dung and urine from their cattle, which is free of cost, to make bio-fertilizers and bio-pest control. In addition to cow dung and urine, they need some fruits, jaggery, etc. which costs around Rs. 2000.00 for each. Since the material costs for purchasing inputs are reduced, there is no need for external

transportation. For labour intensive work, labour is sourced from the farmers themselves who are working for their own land, thus the amount spend on labour is reduced. Even though work required is the same in both convergence and outsourcing, the rate for the work per person is reduced by half, and the total amount is also reduced by half the outsourcing amount. The total amount spent on outsourcing works out to Rs. 68,705, whereas convergence comes in at Rs. 24100, reflecting a saving of around Rs. 44605 by group farming.

Post Harvest

Post-harvest includes getting final products from the harvested crop. Especially for rice, the choice of the product decides the expenses. Major products for paddy crop are paddy as seeds, rice (husk removed) and other value added products like poha, rice noodles, etc.

The main process in post harvest is harvesting the crop. In the outsourcing method, labour for harvesting cost about Rs.10000.00; however as the people in convergence method are of the same village, that cost is halved to only Rs.5000.00. But using a machine it cost Rs 3120 so the technology has been chosen for post harvesting . Other processes like sacking, parboiling and milling are also included in post-harvesting however these costs are not included in this analysis. After each step of processing, the value of the rice increases, thus the income covers expenses and in many cases, gives profit.

Table 7. Post-harvest cost

Post Harvesting				
Particulars	unit	Hour	Daily wages/Rent	Total
Cutting & parboiling	Acres	1	3000	3000
Tarpal Sheet	Days	2	60	120
Total				3120

Table 8. Total Expenses

Total Cost	Outsourcing	Convergence	Amount Saved
Primary Tillage	1900	700	1200
Secondary Tillage	13000	4000	9000
Tiller	150	140	10
Pre-Harvesting	70000	24000	46000
Post-Harvesting	3120	3120	0
For 1 Acre	88170	31960	56210
For 35 Acres	3085950	1118600	1967350

Table 9. Profit /Acre

Profit /Acre				
Product	Acres	Production of Rice (Kg)	Price	Amount
Paddy	1	1032	28	28896
straw	1	24000	24000	24000
Total				52896

Return to Traditional Rice

Returns from Organic Bhavani Rice production

When the crop was harvested in January 2017, the total yield from the 35 acres was 36,120 kg. On average, farmers produced 1032 kg per acre and sold it for Rs. 28.00 per kg, resulting in an average return per acre of Rs. 28896 and also return from straw is Rs 24000. As most of the farmers have one acre, the average return for each producer was Rs. 52896. With this substantial return, the farmers were able to pay off their outstanding debts. Thus it leads to the conclusion that convergence group method of farming is more preferred over individual farming and while this paper only covers the activities of the first year, the results suggest a promising future.

Analysis

In India, the Green Revolution started in the 1960s to overcome poor agriculture productivity by introducing higher-yielding strains of plants and new chemical fertilizers. After 1990 when agriculture (agri+culture) developed into agribusiness (agri+business), there was added pressure on the entire food chain system and farmers were forced to modernize. To feed the increasing population, production is expected to double in size every 10 years (even with the constraints of decreasing land size and water bodies). The existing barter / financial system completely revolves around money and neglects to acknowledge the negative impact on the environment and social systems. To protect the small farmers, the challenge is to find ways to link these growers with high-value markets. More and more people are turning away from food products grown with fertilizers and other chemicals towards organically grown food. Organic rice is growing in demand during this industrial era due to an increase in awareness of the multiple health risks of varieties grown with chemicals.

Amrita Sadivayail Vyavasayam Kulu started with 20 farmers establishing an organic rice farm at Sadivayail, a tribal village located in the sub-urban region of Coimbatore. Amrita SeRve planned and helped the villagers from tillage, collection of seeds, preparation of manures and pesticides, introduction of technological innovations and modern methods in production and processing raw materials, and marketing of the products. Using mobile application, web page and blogs, Amrita SeRve is helping farmers sell their products and by-products. This case also shows the crucial role of the market intermediary (Amrita SeRve) in helping farmers to adopt new technologies that allows for improvement in the quality of their produce.

The study covers the pivotal role played by the Amrita SeRve in the adoption of organic rice production in the villages under study. The institutional support of Amrita SeRve figured consistently as a factor in promoting organic farming in an organized way. This was done by building confidence in the farmers and teaching them how to produce organic paddy, how to produce their own organic

fertilizer and pesticide, and sell the rice at a premium price. Now farmers have the confidence to go for a second crop.

Conclusion

Amrita SeRve aims to promote new practices where health and ecosystems are protected and ensure food security in the villages in which they operate. This analysis shows that the role of Amrita SeRve in promoting organic production, providing technical support and a secured market, is a motor element in influencing the farmers' decision to convert to these new practices.

It is suggested that Government should support the organic farming industry by fixing a competitive price for the paddy produced by small & marginal farmers. A relatively larger initial investment is needed in organic farming thus the need for government support and a cash back policy during the critical conversion from conventional to organic, is required.

Another area for consideration is a new system of capacity building and research which blends traditional methods with technology to reduce the yield gap between organic and conventional farms which remains high.

The responsibility of narrowing that gap of three year results to convert the farmers to organic farming needs the support of civil society at large. If the price of organic rice is higher and gets the proper support of civil society in return society gets the health and environment benefits. Sharing of information and technical knowledge is required for this. The case study revealed that the convergence method is one of the best methods we can adopt for the future for the sustainable growth of agriculture and bring income stability to marginalized communities.

The project is continuing since the last three years and it is a means of livelihood and way to end poverty and hunger in villages and find new job opportunities in rural India.

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